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**PE - 11**

## **IMPROVING THE RESULT OF PHYSICS STUDY OF THE STUDENTS ON CIRCULAR MOTION TOPIC BY USING PROJECT BASED LEARNING**

**Classroom Action Research at class X Science 3 at Public High School (SMAN 68)  
Jakarta-Indonesia.**

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### **ABSTRACT**

The purpose of this research is to improve the result of physics study of the students and to achieve a minimum completeness criteria (KKM) by using Project Based Learning method for class X Science 3 SMAN 68 Jakarta, which KKM value of physics subject is 75. The subject of the research were university students, teachers, and lecturer and the object of the research was 37 students at class X science 3. This action research by Kemmis & Taggart begins with steps: 1) Plan, 2) Act, 3) Observation, and 4) Reflection. Project Based Learning model is a comprehensive study which involve the students in a collaborative investigation, with the steps: Planning, Creating and Processing. This research has been done at SMAN 68 Jakarta-Indonesia in November 2013, semester I. The research was conducted in two cycles, each cycle consist of two meetings. Where each cycle started from planning, implementation actions, observations and reflection. Data collect from student learning outcomes, interviews and events in the field, which is authorized by data triangulation. In the first cycle, the value of the learning outcomes of students reached 43.7%. In the second cycle the value of student learning outcomes reached 84.5%. The result of this action research showed that by implementation Project Based Learning model can improve the result of physics study.

**Keywords :** Project Based Learning, Result of Physics Study

### **INTRODUCTION**

#### **Background**

One of the goals is to make the physics lesson students master the various concepts and principles of physics to develop the knowledge, skills, and attitudes of confidence so that it can be applied in everyday life.

In each of the following learning process in school would have any students expect to get a good learning results, for a good learning results can assist learners in attaining its objectives. A good learning results are only achieved through a learning process anyway. If the learning process is not optimal is very difficult to expect occurrence of good learning results.

The reality on the ground shows that learning outcomes of students in the subjects of physics was still not encouraging. Based on the results of observation and interview students class X MATHEMATICS&NATURAL SCIENCES 3 SMAN 68 Jakarta gets low results studied physics during a given test and more than 50% of students scored below the KKM.

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Students of the material is difficult to presume that they are understood and applied in their lives.

The student learning outcomes of low disebabkan from less effective as the learning process progresses. According to the observations in the field and the results of interviews with students, on learning in class X MIPA 1, X MIPA 2 and X MIPA 3 teacher explaining the subject matter of physics with oriented PPT and Pesona Edu, while X MIPA 4 and X MIPA 5 teachers teaching methods lectures. So learn to be saturating the atmosphere. The teacher only exposes drop formula and example questions. Other factors thought to be the cause of the low yield study science subjects especially physics is physics learning run by educators for this still separates the formal knowledge of physics students with daily experience of learners.

Therefore the need for a formulation that takes students on a more creative level. with sufficient time, in accordance with the time in use to a concept discussion, for the sake of achievement of a curriculum which has been set at school as well as the use of media and models are not too hard can make students and teachers in carrying out the study. The intended Learning Model is a model of project based learning, hereinafter referred to as project-based learning. Isriani and the Goddess (2012: 128) says that this learning model has a great potential to provide learning experiences that are more interesting and meaningful for students. The results of research in America shows that project-based learning has shown satisfactory results (Richmond & Striley, 1996 in Miswanto, 2011: 61).

Based on explanation above in order for the teaching of achieving results in accordance with the purposes for which it was planned, teachers need to consider strategies for effective teaching and learning. Hence the need to research about "efforts to improve the Learning Results of students on the material circular motion with a Learning Model Learning project Based on the Grade 10 MATHEMATICS and NATURAL SCIENCES 3 at SMAN 68 Jakarta".

### **Problem Formulation**

Whether the application of the method of inquiry, constructivism and learning community on the material particle dynamics can enhance student learning outcomes?

### **Research Objectives**

To find out the application of the model of Project Based Learning in improving student learning outcomes in MATHEMATICS and NATURAL SCIENCES grade X 3 at SMAN 68 Jakarta.

## **REVIEW OF THE LITERATURE**

### **The Nature Of Learning Outcomes**

Results of the study cited by Ngalim Purwanto (2003: 84), namely:

"Learning is a strength or a resource that grows from the inside of someone (individual). Learn to relate to one's behaviour with respect to a particular situation caused by his experience over and over in that situation, where changes in behavior that cannot be explained or the basic tendency of the bringing of the response, the maturity or momentary circumstances someone (e.g. fatigue, drugs, and so forth) ".

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Results of the study cited by Munir (2008: 146):

"So the behavior change is a result of learning. Behavior that includes aspects of knowledge (cognitive), attitudes (affective) and skills (psychomotor). Results of the study on the aspect of knowledge is from not knowing to knowing, on the skills of not being able to be able to. The changes that occur in a person include a change in perception and understanding are not always in the form of behavior that can be observed. Learning as knowledge changes stored in the memory. The learning process in view as information processing process that includes three phases, namely the attention (attention), writing in the form of symbols (encoding), and get back information (retrieval) ".

As the science that studies the physics of materials or substances which includes the physical properties, composition, change, and the energy that it generates. Discussing about the method of evaluation in the teaching and learning of physics is very interesting especially in terms of a variety of physical tests in relation to make questions of physics. Some form of test answers, among others, the test is completely false, multiple choice tests and other forms of tests as well as tests with the stuffing or essay or essay form as well. In a process of teaching and learning physics is the assessment of the results of the study of physics is a multilevel work of measurement and assessment with regard to the measurement of the results of the study, physics, physics and learning outcomes assessment of false assertion results studied physics (Kemajaya, 2007: 8).

Minimal completeness Minimal (KKM) is a reference or basic guidelines in determining learning outcomes learner achievement. Based on decision of the DEPDIKNAS (2008: 51) Minimal Completeness minimal established by the unit of education based on the results of deliberation disatuan subjects teacher education or education unit that has several characteristics that are almost the same. Consideration of the educator or forum MGMP (Congress Subject Teacher) are academically into consideration main determination of KKM.

Based on the decision letter of the principal SMAN MGMP 68 and Physics, the value of the KKM set for subjects of physics is 75.

Based on the opinion of the experts above, it can be concluded that the nature of learning is the result of changes that occurred after the occurrence of a learning process. Therefore the results of the study can be observed and measured through tests. assessment of the results of learning physics related to the measurement of the results of its own study of physics and physics learning outcomes assessment. Results of the study referred to in this research is the result of learning on subjects of physics held in Jakarta with a value of 68 SMAN KKM Physics of 75.

### **The Definitions Of Project-Based Learning**

Project-based learning is a learning model that provides opportunities to teachers to manage their learning in the classroom with engaging work project (Isriani and Dewi, 2012: 127).

According to Mahanal (2009: 2) PBL learning in general have a manual step: Planning, Creating (creating or implementation), and Processing.

According to Thomas (2000, in Isriani, 2012: 127-128) focus lies in learning the principles and core concepts of a discipline, involving students in problem solving and investigative activities meaningful tasks to another, giving the opportunity students work autonomously in the mengontruksi their own knowledge, and reached its peak in order to

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produce a real product.

Ellis (2008) also presents that are project-based learning is a great opportunity for discussion for students, parenting students directly to the discovery of a real-world problem, give them pleasure in learning and teaching strategies that can be effective. In this context, students have the option to investigate topics related to real world problems, exchange opinions among groups that discuss different topics, seek knowledge from a variety of sources, taking decisions and presenting projects/results of their discussion. In addition, the use of the project with the flow visualisation (picture drift) that is associated with the scientific performance can improve skills and understandings of students about the project that they are working on.

Based on the opinion of the experts above, it can be concluded that the hakikat model of Learning Project Based Learning is a comprehensive learning involves students collaboratively initiate an investigation. Execution assist students in learning the knowledge and skills that are solidly built through tasks and authentic work.

### **The principles of project-based learning**

At least there are five principles of project-based learning, according to Thomas as quoted Wena (2011, in Isriani, 2012: 128), among other things:

- a. the principle of Sentralisk  
The principle of sentralis confirms that the project work is the very essence of the curriculum.
- b. the principles of the driving question  
This principle is external motivation that is able to excite her independence in teaching learning tasks
- c. the principle of Autonomous  
The independence of the students in the learning process.
- d. the principle of Realistic  
The principle says that the project is something real, not like at school.

### **Advantages Of Project Based Learning**

Moursund was quoted as saying according to Vena, 2011 (in Isriani, 2012: 130-131) some benefits of project-based learning, among others, as follows:

- a. Increased motivation  
Project-based learning proving to be able to increase the motivation of learning students.
- b. Increased problem-solving ability  
Project-based learning can be meningkatkan the ability to troubleshoot, make students more actively and successfully solve the problem-the problem is complex
- c. Improved library research skills  
With project-based learning skills of the students to search for and obtain information will
- d. Increase Increased collaboration  
Students can develop and practice the skills of communication and co-operation.
- e. Increased resource-management skills  
Project-based learning gives students learning and practice in organizing the project and make the allocation of time and other resources such as supplies to complete the task.

### **Disadvantages Of Project Based Learning**

As for some of the lack of Execution is as follows:

- a. Execution requires a lot of time must be provided to complete a complex problem.
  - b. the number of equipment should be provided.
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- c. Allow learners to be saturated because of dealing directly with the problem.
- d. Allow learners the difficulty in processing a number of data and information in a short time, project-based learning so that it lasts a long time.
- e. it is difficult to choose the right projects.
- f. the difficulty of finding reference sources as appropriate.

## RESEARCH METHODS

The methods used in this research is the research action class (Classroom Action Research). (Kunandar, 2008) Classroom Action Research according to the Kemmis and Mc Taggart is a form of discovery problem himself was ordered by the participant-the participant in a situation which aims to develop or enhance kersionalan and assess the social practices and their education once they understand the situations. Research done in cycles-sklus, each of which consists of planning (planning), actions (acting), observation (observing), and reflection (reflecting).

This research was carried out in Jakarta on 68 SMAN class X MATHEMATICS NATURAL SCIENCES 3 in odd semester academic year 2013/2014. SMAN 68 Jakarta is located at Jalan Salemba Raya No. 18, Central Jakarta.

### *Cycle I*

#### a. Planning

At this stage of the Planning Act, researchers make data collection instruments in the form of sheets of observation, tests and worksheets thinking ability learners. Make Learning implementation plan (RPP) to suit the Learning Project Based Learning model which will be delivered in the learning process on the material circular motion.

#### b. Implementation

At this stage of the implementation of the study the researchers using the Learning Project Based Learning model with the following steps:

Table 1. Research On The Implementation Of The Activities Of The Design Cycle I

NO	ACTIVITIES	LEARNING ACTIVITIES
1	Observing	Watched the Video a roller coaster and flywheel
2	(Questioning)	Class discussion about quantities of contraction, frequency, angular velocity and linear velocity
3	(Experimenting)	Experiment about the centripetal force
4	(Associating)	Guiding learners (the Group) to analyze the causes of the water does not spill over while playing with rope Learners (groups) can be summed up the results of the analysis
5	(Communicating)	Presented the results of group discussions related experiment centripetal force Learners can solve some problems in the practice of writing questions Learners guided teachers to discuss the project that will be implemented for the next material

#### a. Observations

The observation is done collaboratively between teachers, assisted by three colleagues, teachers and professors supervising the UNJ done concurrently with the stages of the implementation of the action. Photographed the events that occurred during a cycle-cycle, as well as making the recording data for field notes from interviews with students over all events that occur during the learning process. The observations recorded in the observation sheet. (Secondary Data/value Data of students, events and Data interview).

#### b. Reflection

Researchers monitor and evaluate the results of his observations were obtained in cycle I then make a interpretasinya. All the observations reviewed together by the teacher, researcher, and colleagues. The reflection is used to assist in problem solving and planning cycle II if there are still deficiencies in the cycle I.

### **Cycle II**

#### a. Planning

The planning cycle II is a reflection of the cycle I, at this stage the teacher is more motivating students and conduct activities which can make students more active.

#### b. Implementation

At this stage of the implementation of the research study using Project Based learning with the following steps:

Table 2. Research On The Implementation Of The Activities Of The Design Cycle II

NO	ACTIVITIES	LEARNING ACTIVITIES
1	(Observing)	Video waterwheel and race bicycle race
2	(Questioning)	Class discussion about these kinds of relationships are wheels that are in everyday life
3	(Experimenting)	Experiment on the influence of the radius of the wheel with a linear speed, seporos and wheel wheels connected by a cord.
4	(Associating)	Guiding learners (the Group) to analyze on the influence of the radius of the wheel with the linear velocity, the speed of the wheels seporos and wheels connected by a cord.
		Learners (groups) can be summed up the results of the analysis
5	(Communicating)	Presented the results of group discussions related experiments the influence of the radius of the wheel with a linear speed, seporos and wheel wheels connected by a cord.
		Learners can solve some problems in the practice of writing questions
		Learners can mention other applications of circular motion

#### a. Observations

Observations made are still the same as i. cycle Recorded all new findings that occurred during the learning process. The observations collected Data to be processed and analyzed

#### b. Reflection

Indicator of success has been achieved then the cycle is stopped.

## RESEARCH RESULTS & DISCUSSION

After this Class Action Research was carried out by two cycles then retrieved the data based on the method of triangulation of data, namely:

### 1. Event Data

This research is a research action class (classroom action research) using the procedures developed by Kemmis and Taggart (1990) with these forces cycle designs that will be terminated if it is found or reached the charge indicators will, in this case the results of student learning has reached the value of KKM Physics 75. This research was carried out on November 15, 2013 (Cycle I) and 22 December 2013 (Cycle II) SMAN 68 Jakarta located on Jalan Salemba Raya No. 18, Central Jakarta. The object of his research are the children of class X MATHEMATICS & NATURAL SCIENCES 3 on odd semester academic year 2013/2014. SMAN 68 Jakarta.

In this research study results on the dynamics of particle motion material tested with a test action to get results of student learning. The research was carried out in two cycles that include both cycle done the reflection with a view to sharpen the actions so that the data can be obtained that really illustrates the success of the method. As for the acquisition of student learning outcomes as follows:

Table 3. Data on student learning Results Acquisition Cycle I and Cycle II

Aspects Of Assessment	Cycle I	Cycle II
Cognitive (Post test)	43.7%	84.5%
Psychomotor (Demonstration)	45.3%	83.5%
Affective (Attitude and motivation of students)	Assessment of the scientific attitude and motivation of students not yet optimal.	Assessment of the scientific attitude is increased significantly. Almost all students demonstrate high enthusiasm in following the instruction.

Diagram Hasil Belajar Siswa Dalam Pembelajaran Fisika

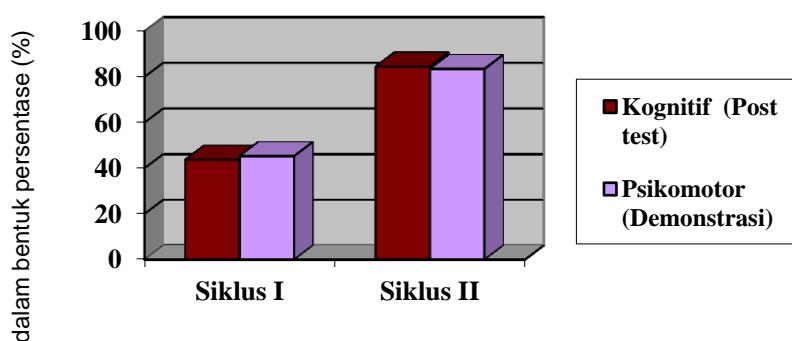


Figure 1. Student Learning Outcomes Chart



## 2. Interview Data

This research was supported by the results of the interview for some objects such as students and teachers. As for the results of the interview are as follows:

### a. the respondent Teachers

There are three questions that I ask to 3 teachers are as follows: (1) do you agree if the composition of the teaching and learning activities more experiment (experimenting in the laboratory) of the theoretical (lectures in class)? Any teacher answer which are two diverse teachers answer agree, because the application implementation (practical work) that spurred kids to be active in working and sharpen understanding of theory. While one teacher's answer did not agree, because physics more on mathematical calculations that are in dire need of time to explain. (2) according to the father/mother, whether the use of the learning media can impact both for the student's understanding of physics? All of the teachers said yes. Learning that the media is very good for understanding impact students. (3) whether the learning of physics have been father/mother teach to students already centered on student activities (research, project, etc.)? The majority of teachers answered Yes, already realized.

### b. 5 Respondents Students

There are three questions that I ask to 5 students are as follows: (1) do you think with the help of the media learning can improve the understanding of the concept of physics? All the students say yes, that the media is very helpful at all in learning. (2) whether by way of a teacher teaching using methods such as this (constructivism, inquiry and learning community) you feel pleased and became increasingly understand the concept of such material? All the students said yes, they are very excited and are becoming increasingly savvy will be the concept of such material. (3) do you agree if teachers more creative future in teaching, in particular in developing methods of learning new ones to avoid monotony and students do not quickly bored in study? All the students said yes very much agree. Creative teacher will give birth to a generation of smart.

### c. Data Documentation



Gambar 2. Learning activities





Gambar 3. Planning RPP



Gambar 4. Learning activities

## CONCLUSION

Impelentasi learning model of Project Based Learning in class X MATHEMATICS & NATURAL SCIENCES 3 SMAN 68 Jakarta, is generally experienced an increase in student learning outcomes that had already reached a value close to 75 percent with a KKM consecutively cycle I (43.7%), cycle II (84.5%). It is recommended to increase the ability of teachers to teach and guide students in their ability. Teachers are expected to use the learning model in accordance with the subjects or subject matter considering.

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